

Claims

1. (currently amended) An antimicrobial composition for sustained treatment of dental unit water comprising a substantially dry mixture of effective amounts of a quaternary ammonium compound, an oxidizing agent, ~~and an antimicrobial metal~~ a silver compound, and citric acid.

2. (original) The composition of claim 1, wherein the quaternary ammonium compound is selected from the group consisting of n-alkyl dimethyl benzyl ammonium chloride, n-alkyl dimethyl ethylbenzyl ammonium chloride, n-alkyl dimethyl 3,4-dichlorobenzyl ammonium chloride, dioctyl dimethyl ammonium chloride, didecyl dimethyl ammonium chloride, cetyl pyridinium chloride, and combinations thereof.

3. (original) The composition of claim 1, wherein the quaternary ammonium compound is present in a concentration of about 0.2% to about 40% by weight.

4. (original) The composition of claim 1, wherein the quaternary ammonium compound is present in a concentration of about 0.5% to about 20% by weight.

5. (original) The composition of claim 1, wherein the oxidizing agent forms hydrogen peroxide or a peroxyacid in solution.

6. (currently amended) The composition of claim 1, wherein the oxidizing agent is selected from the group consisting of sodium percarbonate, potassium peroxymonosulfate, sodium perborate monohydrate, sodium perborate hexahydrate, ~~calcium hypochlorite~~, calcium peroxide, magnesium peroxide, urea peroxide, ~~sodium chlorite~~, and combinations thereof.

7. (original) The composition of claim 1, wherein the oxidizing agent comprises sodium percarbonate.

8. (original) The composition of claim 1, wherein the oxidizing agent is present in a concentration of about 0.2% to about 20% by weight as active oxygen.

9. (original) The composition of claim 1, wherein the oxidizing agent is present in a concentration of about 0.5% to about 3% by weight as active oxygen.

10. (cancelled)

¹⁰
11. (currently amended) The composition of claim [[10]] 1, wherein the silver compound is selected from the group consisting of silver nitrate, silver nitrite, silver citrate, silver phosphate, silver benzoate, silver acetate, silver chlorate, silver chlorite, silver perchlorate, silver fluoride, silver sulfate, colloidal silver, and combinations thereof.

¹¹
12. (currently amended) The composition of claim [[10]] 1, wherein the silver compound is present in a concentration of about 0.02% to about 1.5% by weight as silver.

¹²
13. (currently amended) The composition of claim [[10]] 1, wherein the silver compound is present in a concentration of about 0.05% to about 0.5% by weight as silver.

14-15. (cancelled)

¹³
16. (currently amended) The composition of claim [[14]] 1, wherein the ~~chelating/coordinating compound~~ citric acid is present in a concentration of about 2% to about 75% by weight.

17. (cancelled)

¹⁴
18. (original) The composition of claim 1, wherein the composition is in tablet form.

¹⁵
19. (original) The composition of claim ¹⁴18, wherein the quaternary ammonium compound is selected from the group consisting of n-alkyl dimethyl benzyl ammonium chloride, n-alkyl dimethyl ethylbenzyl ammonium chloride, n-alkyl dimethyl 3,4-dichlorobenzyl ammonium chloride, dioctyl dimethyl ammonium chloride, didecyl dimethyl ammonium chloride, cetyl pyridinium chloride, and combinations thereof.

¹⁶
20. (original) The composition of claim ¹⁴18, wherein the oxidizing agent forms hydrogen peroxide or a peroxyacid in solution.

¹⁷
21. (currently amended) The composition of claim ¹⁴18, wherein the oxidizing agent is selected from the group consisting of sodium percarbonate, potassium peroxymonosulfate, sodium perborate monohydrate, sodium perborate hexahydrate, ~~calcium hypochlorite~~, calcium peroxide, magnesium peroxide, urea peroxide, ~~sodium chlorite~~, and combinations thereof.

¹⁸
22. (original) The composition of claim ¹⁴18, wherein the oxidizing agent comprises sodium percarbonate.

¹⁹
23. (currently amended) The composition of claim ¹⁴18, wherein the ~~antimicrobial metallic compound~~ is a silver compound is selected from the group consisting of silver nitrate, silver nitrite, silver citrate, silver phosphate, silver benzoate, silver acetate, silver chlorate, silver chlorite, silver perchlorate, silver fluoride, silver sulfate, colloidal silver, and combinations thereof.

24-28. (cancelled)

²⁰
29. (currently amended) The composition of claim ¹⁴18, wherein the oxidizing agent ~~28,~~ further comprising a compound that reacts with citric acid in solution to produce effervescence.

²¹
30. (currently amended) An antimicrobial composition for sustained treatment of dental unit water comprising a substantially moisture-free mixture of effective amounts of a quaternary

ammonium compound, an oxidizing agent, ~~and an antimicrobial metallic~~ a silver compound, and
citric acid.

²²

31. (currently amended) An antimicrobial composition comprising:

from about 0.2% to about 40% by weight of a quaternary ammonium compound;

from about 0.2% to about 20% by weight as active oxygen of an oxidizing agent; ~~and~~

from about 0.02% to about 1.5% by weight as silver of a silver compound; and

from about 2% to about 75% by weight of citric acid.

32-33. (cancelled)

²³

34. (original) The composition of claim ²²31, wherein the composition is in tablet form.

35. (cancelled)

²⁴

36. (currently amended) A method for causing sustained antimicrobial activity in a water supply comprising:

providing a substantially dry composition comprising effective amounts of a quaternary ammonium compound, an oxidizing agent, ~~and an antimicrobial metallic~~ a silver compound, and
citric acid; and

forming a mixture comprising water and said composition.

²⁷

37. (currently amended) ~~The method of claim 36,~~ A method for causing sustained
antimicrobial activity in a water supply comprising:

providing a substantially dry composition comprising effective amounts of a quaternary
ammonium compound, an oxidizing agent, and an antimicrobial metallic compound; and

forming a mixture comprising water and said composition, wherein the mixture is formed in
a dental unit reservoir.

²⁸
38. (currently amended) The method of claim ²⁷37, further comprising cleaning the ~~biofilms~~ biofilm from the dental unit before forming the mixture in the dental unit reservoir.

²⁹
39. (currently amended) The method of claim ²⁸38, wherein cleaning the ~~biofilms~~ biofilm from the dental unit comprises performing a shock treatment.

³⁷
40. (currently amended) ~~The method of claim 36,~~ A method for causing sustained antimicrobial activity in a water supply comprising:

providing a substantially dry composition comprising effective amounts of a quaternary ammonium compound, an oxidizing agent, and an antimicrobial metallic compound;

forming a mixture comprising water and said composition; and

~~further comprising~~ introducing the mixture into a dental unit reservoir.

³⁸
41. (currently amended) The method of claim ³⁷40, further comprising cleaning the ~~biofilms~~ biofilm from the dental unit before introducing the mixture into the dental unit reservoir.

³⁹
42. (currently amended) The method of claim ³⁸41, wherein cleaning the ~~biofilms~~ biofilm from the dental unit comprises performing a shock treatment.

⁴⁰
43. (currently amended) ~~The method of claim 36,~~ A method for causing sustained antimicrobial activity in a water supply comprising:

providing a substantially dry composition comprising effective amounts of a quaternary ammonium compound, an oxidizing agent, and an antimicrobial metallic compound;

forming a mixture comprising water and said composition; and

~~further comprising~~ performing a dental treatment on a patient in which the patient comes in contact with the mixture.

²⁵
44. (currently amended) The method of claim ²⁴36, wherein the mixture comprises:
from about 0.2 mg/L to about 20 mg/L of [[a]] the quaternary ammonium compound;
from about 0.2 mg/L to about 20 mg/L as active oxygen of [[an]] the oxidizing agent; and

from about 0.02 mg/L to about 1.5 mg/L as silver of [[a]] the silver compound; and
from about 2% to about 75% by weight of the citric acid.

²⁴
45. (currently amended) The method of claim ²⁴36, wherein the mixture comprises:
from about 0.5 mg/L to about 10 mg/L of [[a]] the quaternary ammonium compound;
from about 0.5 mg/L to about 3 mg/L as active oxygen of [[an]] the oxidizing agent; and
from about 0.05 mg/L to about 0.5 mg/L as silver of [[a]] the silver compound; and
from about 2% to about 75% by weight of the citric acid.

⁵¹
46. (original) A method for causing sustained antimicrobial activity in a dental unit
water supply comprising:
providing a tablet comprising effective amounts of a quaternary ammonium compound, an
oxidizing agent, a silver compound, and citric acid; and
forming a mixture comprising water and at least a portion of the tablet.

⁵²
47. (original) The method of claim ⁵¹46, wherein forming a mixture includes adding at
least a portion of the tablet to a dental unit reservoir, further comprising allowing the mixture to
effervesce.

⁵³
48. (original) The method of claim ⁵²47, wherein the mixture is ready for use in dental
treatment within fifteen minutes after adding at least a portion of the tablet to the dental unit
reservoir.

⁵⁴
49. (original) The method of claim ⁵¹46, wherein the mixture is formed in a dental unit
reservoir.

⁵⁵
50. (currently amended) The method of claim ⁵⁴49, further comprising cleaning the
~~biofilms~~ biofilm from the dental unit before forming the mixture in the dental unit reservoir.

⁵¹51. (currently amended) The method of claim ⁵⁰50, wherein cleaning ~~the biofilms~~ biofilm from the dental unit comprises performing a shock treatment.

⁵¹52. (original) The method of claim ⁴⁶46, further comprising introducing the mixture into a dental unit reservoir.

⁵³53. (currently amended) The method of claim ⁵²52, further comprising cleaning ~~the biofilms~~ biofilm from the dental unit before introducing the mixture into the dental unit reservoir.

⁵⁴54. (currently amended) The method of claim ⁵³53, wherein cleaning ~~the biofilms~~ biofilm from the dental unit comprises performing a shock treatment.

⁵⁵55. (original) The method of claim ⁴⁶46, further comprising performing a dental treatment on a patient in which the patient comes in contact with the mixture.

⁵⁶56. (original) The method of claim ⁴⁶46, wherein the mixture comprises:
from about 0.2 mg/L to about 20 mg/L of a quaternary ammonium compound;
from about 0.2 mg/L to about 20 mg/L as active oxygen of an oxidizing agent; and
from about 0.02 mg/L to about 1.5 mg/L as silver of a silver compound.

⁵⁷57. (original) The method of claim ⁴⁶46, wherein the mixture comprises:
from about 0.5 mg/L to about 10 mg/L of a quaternary ammonium compound;
from about 0.5 mg/L to about 3 mg/L as active oxygen of an oxidizing agent; and
from about 0.05 mg/L to about 0.5 mg/L as silver of a silver compound.

⁵⁸58. (currently amended) A method for making a composition comprising:
providing a quaternary ammonium compound;
providing an oxidizing agent;
providing ~~an antimicrobial metal~~ a silver compound; and
providing citric acid; and

forming at least the quaternary ammonium compound, oxidizing agent, silver and antimicrobial-metallic compound, and citric acid into a tablet.

59-65. (cancelled)

³⁰
~~66.~~ (new) The method of claim ²⁷~~37~~, further comprising maintaining the microbial contamination in the dental unit reservoir at less than 0.05 log (CFU/mL) for at least five consecutive days.

³¹
~~67.~~ (new) The method of claim ²⁷~~37~~, wherein forming the mixture comprises adding the composition to the dental unit reservoir once daily for at least five consecutive days.

³²
~~68.~~ (new) The method of claim ²⁷~~37~~, further comprising substantially inhibiting the growth of biofilm in a dental unit water system connected to the dental unit reservoir.

³³
~~69.~~ (new) The method of claim ²⁷~~37~~, wherein the composition is in tablet form.

³⁴
~~70.~~ (new) The method of claim ²⁷~~37~~, wherein the mixture is acidic.

³⁵
~~71.~~ (new) The method of claim ²⁷~~37~~, wherein the composition further comprises citric acid.

³⁶
~~72.~~ (new) The method of claim ³⁵~~71~~, wherein the oxidizing agent reacts with the citric acid in solution to produce effervescence.

⁴⁰
~~73.~~ (new) The method of claim ³⁷~~40~~, further comprising maintaining the microbial contamination in the dental unit reservoir at less than 0.05 log (CFU/mL) for at least five consecutive days.

⁴¹
74. (new) The method of claim ³⁷40, further comprising substantially inhibiting the growth of biofilm in a dental unit water system connected to the dental unit reservoir.

⁴²
75. (new) The method of claim ³⁷40, wherein the composition is in tablet form.

⁴³
76. (new) The method of claim ³⁷40, wherein the mixture is acidic.

⁴⁴
77. (new) The method of claim ³⁷40, wherein the composition further comprises citric acid.

⁴⁵
78. (new) The method of claim ⁴⁴77, wherein the oxidizing agent reacts with the citric acid in solution to produce effervescence.

⁴⁷
79. (new) The method of claim ⁴⁶43, wherein the composition is in tablet form.

⁴⁸
80. (new) The method of claim ⁴⁶43, wherein the mixture is acidic.

⁴⁹
81. (new) The method of claim ⁴⁶43, wherein the composition further comprises citric acid.

⁵⁰
82. (new) The method of claim ⁴⁹81, wherein the oxidizing agent reacts with the citric acid in solution to produce effervescence.

⁶³
83. (new) The method of claim ⁵¹46, wherein the mixture is acidic.

⁶⁴
84. (new) The method of claim ⁵¹46, further comprising maintaining the microbial contamination in the dental unit water supply at less than 0.05 log (CFU/mL) for at least five consecutive days.

⁶⁵
~~85~~. (new) The method of claim ⁶¹~~46~~, wherein the oxidizing agent reacts with the citric acid in solution to produce effervescence.